

**CONTACT  
INFORMATION**

Statistical Sciences, CCS-6  
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**RESEARCH  
INTERESTS**

I am interested in developing statistical methodology, specifically Bayesian methodology, for consequential problems in a variety of contexts, with a focus on uncertainty quantification. Application areas I have worked in include disease forecasting, space weather, astronomy, systems reliability, hydrology, materials science, inertial confinement fusion, nutrition, and physical activity.

**EDUCATION**

**Ph.D. Statistics (2015)**, *Iowa State University*, Ames, IA  
Advisor: Petruța Caragea  
Thesis: Applications of and extensions to state-space models

**M.S. Statistics (2011)**, *Iowa State University*, Ames, IA  
Advisor: Alicia Carriquiry  
Creative Component: A genetic algorithm approach to optimize planning of food fortification

**B.A. Math/Statistics and Religion (2008)**, *Luther College*, Decorah, IA  
Phi Beta Kappa, *summa cum laude*

**EMPLOYMENT  
HISTORY**

**Los Alamos National Laboratory**, Los Alamos, NM

- Scientist in the Statistical Sciences Group (September 2016 - present)
  - Develop statistical methodology supporting a wide variety of national security-relevant applications
  - Application areas I work in include disease forecasting, space weather, astronomy, systems reliability, hydrology, and materials science

**Los Alamos National Laboratory**, Los Alamos, NM

- Postdoctoral Researcher (July 2015 - September 2016)
  - Uncertainty quantification for reduced order models
  - Advisor: Scott Vander Wiel
  - Forecasting of infectious diseases with UQ
  - Advisors: Sara Del Valle and James Gattiker

**Los Alamos National Laboratory**, Los Alamos, NM

- Graduate Research Assistant (Summer 2013, Summer 2014, Spring 2015)
  - Developed a novel, dynamic forecasting model for electron flux in the Van Allen radiation belt in collaboration with the Space Science and Applications group (Summer 2013)
  - Advisors: Dave Higdon and Brian Weaver
  - Developed a non-linear, non-Gaussian state-space model and worked on uncertainty quantification problems for disease outbreak forecasting in collaboration with the Mathematical and Computational Epidemiology group (Summer 2014, Spring 2015)
  - Advisor: Dave Higdon

**Iowa State University**

- Center for Survey Statistics and Methodology, Ames, IA

- Research Assistant (2010—2014)
- Measurement error modeling of usual, daily energy expenditure in collaboration with the Department of Kinesiology at ISU
- Advisors: Sara Nusser, Alicia Carriquiry, Wayne Fuller
- Department of Human Services, Des Moines, IA
  - Research Assistant (2009—2010)
  - Provided statistical analysis and data visualization for the annual Medicaid for Employed People with Disabilities survey

**Best Buy Corporate**, Richfield, MN

- Demand Forecast Analyst (2008—2009)
  - Designed, developed, and tested regression based promotional forecasting software
  - Provided statistical consultation for Best Buy Express

**PUBLICATIONS**  
(\*all authors  
contributed  
equally)

18. R. Priedhorsky, A. R. Daughton, **D. Osthus**. Estimating Influenza Incidence Using Search Query Deceptiveness and Generalized Ridge Regression *accepted at PLOS Computational Biology*
17. **D. Osthus**, S. A. Vander Wiel, N. M. Hoffman, F. J. Wysocki (2019). Prediction Uncertainties Beyond the Range of Experience: A Case-Study in Inertial Confinement Fusion Implosion Experiments. *SIAM/ASA Journal of Uncertainty Quantification* 7(2), 604-633.
16. \*A. Loy, \*K. Maurer, \***D. Osthus** (2019). A Tale of Four Cities: Exploring the Soul of Biloxi, Detroit, Milledgeville, and State College. *Computational Statistics* 1-23.
15. N. G. Reich, L. C. Brooks, S. J. Fox, S. Kandula, C. J. McGowan, E. Moore, **D. Osthus**, E. L. Ray, A. Tushar, T. K. Yamana, M. Biggerstaff, M. A. Johansson, R. Rosenfeld, J. Shaman (2019). A collaborative multiyear, multimodel assessment of seasonal influenza forecasting in the United States. *Proceedings of the National Academy of Sciences* 116(8), 3146-3154.
14. **D. Osthus**, A. R. Daughton, R. Priedhorsky (2019). Even a good flu forecasting model can benefit from internet-based nowcasts, but those benefits are limited. *PLOS Computational Biology* 15 (2): e1006599.
13. J. Hyman, A. Hagberg, **D. Osthus**, S. Srinivasan, H. Viswanathan, G. Srinivasan (2018). Identifying Backbones in Three-Dimensional Discrete Fracture Networks: A Bipartite Graph-Based Approach. *SIAM Multiscale Modeling and Simulation* 16 (4): 1948–1968.
12. G. Srinivasan, J. Hyman, **D. Osthus**, B. Moore, D. O'Malley, S. Karra, E. Rougier, A. Hagberg, A. Hunter, H. Viswanathan (2018). Quantifying Topological Uncertainty in Fractured Systems using Graph Theory and Machine Learning. *Nature Scientific Reports* 8 (1): 11665.
11. H. Godinez, E. Rougier, **D. Osthus**, Z. Lei, E. Knight, G. Srinivasan (2018). Fourier Amplitude Sensitivity Test Applied to Dynamic Combined Finite Discrete Element Methods-based Simulations. *International Journal for Numerical and Analytical Methods in Geomechanics*
10. **D. Osthus**, J. Gattiker, R. Priedhorsky, S. Del Valle (2019). Dynamic Bayesian Influenza Forecasting in the United States with Hierarchical Discrepancy (with Discussion). *Bayesian Analysis* 14 (1): 261-312.
9. **D. Osthus**, H. Godinez, E. Rougier, G. Srinivasan (2018). Calibrating the Stress-Time Curve of a Combined Finite-Discrete Element Method to a Split Hopkinson Pressure Bar Experiment *International Journal of Rock Mechanics and Mining Sciences* 106: 278-288.

8. E. Casleton, **D. Osthus**, K. Van Buren (2018). Imputation for Multi-Source Data with Comparison and Assessment Techniques. *Applied Stochastic Models in Business and Industry* 34 (1): 44-60.
7. **D. Osthus**, K. S. Hickmann, P. C. Caragea, D. Higdon, S. Del Valle. (2017) Forecasting seasonal influenza with a state-space SIR model. *Annals of Applied Statistics* 11 (1): 202-224.
6. R. Priedhorsky, **D. Osthus**, A. Daughton, K. Moran, N. Generous, G. Fairchild, A. Deshpande, S. Del Valle. (2017) Measuring global disease with Wikipedia: Success, failure, and a research agenda. *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing*.
5. K. R. Moran, G. Fairchild, N. Generous, K. Hickmann, **D. Osthus**, R. Priedhorsky, J. Hyman, S. Del Valle. (2016) Epidemic forecasting is messier than weather forecasting: the role of human behavior and Internet data streams in epidemic forecasting. *The Journal of Infectious Diseases* 214 (suppl 4): S404-S408.
4. **D. Osthus**, P. C. Caragea, D. Higdon, S. K. Morley, G. D. Reeves, B. P. Weaver. (2014) Dynamic linear models for forecasting of radiation belt electrons and limitations on physical interpretation of predictive models. *Space Weather* 12 (6): 426-446.
3. G. J. Welk, Y. Kim, B. Stanfill, **D. Osthus**, A. M. Calabro, S. Nusser, A. Carriquiry, (2014) Validity of 24 Hour Physical Activity Recall: Physical Activity Measurement Survey. *Medicine and Science in Sports and Exercise* 46 (10): 2014-2024.
2. W. A. Fuller and **D. Osthus**. (2014) Properties of measures of usual daily energy expenditure. *Proceedings of Statistics Canada Symposium 2014*
1. \*J. Crowley, \*B. Curley, \***D. Osthus**. (2010) What is JEOPARDY!?: A graphical exploration from 1984-2009. *Chance* 23 (4): 6-14.

**PUBLICATIONS  
IN  
PREPARATION**  
(\*all authors  
contributed  
equally)

3. \*E. Casleton, \***D. Osthus**, \*B. Weaver. Clustering Craters on the Moon with Dysfunctional Families. *intended for submission at the Annals of Applied Statistics*
2. **D. Osthus**, J. Hyman, S. Karra, N. Panda, G. Srinivasan. An Unsupervised Learning Approach for Simulating Primary Subnetworks of Discrete Fracture Networks with Quantified Uncertainty. *intended for submission at the Journal of Uncertainty Quantification*
1. **D. Osthus** and K. R. Moran. Multiscale Flu Forecasting. *intended for submission at the Proceedings of the National Academy of Sciences*

**PRESENTA-  
TIONS**  
(\*invited)

12. Multiscale Flu Forecasting. *Joint Statistical Meetings*. Denver, CO (July, 2019).
11. \*The 2017/18 Influenza Season Collaborative Challenge. *CDC 2017-2018 Flu Forecasting Workshop*. Atlanta, GA (August, 2018).
10. \*The Value of the Centers for Disease Control and Prevention's Flu Forecasting Challenge: One participant's nuanced perspective. *Joint Research Conference 2018*. Santa Fe, NM (June, 2018).
9. \*Dynamic Bayesian Influenza Forecasting in the United States with Hierarchical Discrepancy. *SIAM Uncertainty Quantification 2018*. Garden Grove, CA (April, 2018).
8. \*Flu Forecasting on the Fly. *CDC 2016-2017 Flu Forecasting Workshop*. Atlanta, GA (August, 2017).

7. \*Model discrepancy and influenza forecasting: A Bayesian hierarchical modeling approach. *SIAM Computational Science and Engineering*. Atlanta, GA (February, 2017).
6. \*Can Wikipedia improve flu forecasts in the United States? *Joint Statistical Meetings*. Chicago, IL (August, 2016).
5. \*Forecasting Seasonal Influenza with a State-space Susceptible-Infectious-Recovered Model. *Iowa State University Statistics Seminar*. Ames, IA (June, 2015).
4. Estimating the Distribution of Usual Daily Energy Expenditure. *Iowa State University Survey Working Group*. Ames, IA (February, 2014).
3. \*Electron Flux, Solar Wind Speed, Sunspots, and Dynamic Linear Models. *Los Alamos National Laboratory Statistical Sciences Seminar Series*. Los Alamos, NM (July, 2013).
2. A Bayesian Approach to Model Daily Physical Activity. *Iowa State University Survey Working Group*. Ames, IA (October, 2011).
1. A Genetic Algorithm Approach to Optimize Planning of Food Fortification Programs. *Joint Statistical Meetings*. Miami, FL (August, 2011).

## POSTER PRESENTATIONS

7. Probabilistic Forecasting of Seasonal Influenza in the United States. *Conference on Data Analysis 2016*. Santa Fe, NM (March, 2016).
6. Probabilistic Forecasting of Seasonal Influenza in the United States. *Physics Informed Machine Learning Conference*. Santa Fe, NM (January, 2016).
5. Electron Flux, Solar Wind Speed, Sunspots, and Dynamic Linear Models. *Conference on Data Analysis 2014*. Santa Fe, NM (March, 2014).
4. Electron Flux, Solar Wind Speed, Sunspots, and Dynamic Linear Models. *American Statistical Association Iowa Chapter Meeting*. Ames, IA (November, 2013).
3. A Tale of Four Cities. *Joint Statistical Meetings*. Montreal, Canada (August, 2013).
2. Intake Monitoring Assessment and Planning Program. *Conference on Statistical Practice*. New Orleans, LA (February, 2013).
1. Selecting the “Best” Food Fortification Plan. *8th International Conference on Diet and Activity Methods*. Rome, Italy (May, 2012).

## FUNDING

1. Improving Predictions of Complex Systems with Predictive Discrepancy Models and Data Fusion (PI). Awarded in 2019 by the *Laboratory Directed Research and Development Program* of Los Alamos National Laboratory, funded at \$416,000 over two years.

## AWARDS & RECOGNITIONS

**2017–2018** Forecast the Flu Challenge 2nd, 3rd, and 4th place finisher out of 29 models, hosted by the Centers for Disease Control and Prevention

**2017** R&D 100 winner for WikiEpiCast

**2016–2017** Forecast the Flu Challenge 4th place finisher out of 28 models, hosted by the Centers for Disease Control and Prevention

**2015** Los Alamos National Laboratory Distinguished Performance Award for contributions made to the Mathematical and Computational Epidemiology team

**2014** Los Alamos Statistical Sciences Conference Grant for participation in the Conference on Data Analysis

**2013** ASA Data Expo 2nd place award for poster presentation “A Tale of Four Cities”

with Karsten Maurer and Adam Loy

**2009–2013** Jebe Fellowship at Iowa State University

**2009** GlaxoSmithKline Industrial Scholarship

**2007** Robert S. Jacobsen Scholarship at Luther College

**2004–2008** Dean's List at Luther College

**MEDIA  
COVERAGE**

Influenza forecasting for the 2017/18 flu season in **Business Insider** (January, 2018) and **Axios** (February, 2018).

Influenza forecasting project with Del Valle and Priedhorsky was covered in **Live Science** and picked up by **The Huffington Post** and **Scientific American** (December, 2015).

**WORKSHOPS**

Using IMAPP (Intake Monitoring Assessment and Planning Program) to Assess Nutrient Intake and Plan Intakes for Groups. *16th Congress of the Latin American Nutrition Society*. Havana, Cuba (November, 2012).

- Prepared material for and co-led a two hour tutorial teaching nutritionists how to use IMAPP software.

**JOURNAL  
REFEREE**

- *PLOS Computational Biology*
- *Nature Scientific Reports*
- *Epidemiology and Infection*

**GRADUATE  
COURSES**

Statistical Methods 1 & 2  
Introduction to Statistical Computing  
Theory of Linear Models  
Design of Experiments  
Exploratory Methods and Data Mining  
Advanced Statistical Methods  
Spatial Statistics  
Time Series  
Reliability (audit)

Probability and Statistics 1 & 2  
Multivariate Statistical Methods  
Methods of Counts and Proportions  
Theory and Application of Survey Sampling  
Bayesian Statistics  
Advanced Probability Theory  
Advanced Theory of Statistical Inference  
Advanced Bayesian Methods

**SERVICE**

Honors and Awards Committee Member, STAT-ers	Fall 2012 - Spring 2013
Safety Committee Member, STAT-ers	Fall 2011 - Spring 2012
Diversity Committee Member, STAT-ers	Fall 2010 - Spring 2011
Recycling Committee Member, STAT-ers	Fall 2009 - Spring 2010

**TECHNICAL  
SKILLS**

Statistical Software: R (significant experience)  
JMP, SAS, Matlab (some experience)  
Computer Applications:  $\text{\TeX}$ ,  $\text{\LaTeX}$ , knitr, Microsoft Office  
Operating Systems: Apple OS X, Microsoft Windows